

REMARKS

The Office Action dated March 11, 2003 has been received and carefully noted. The following remarks, are submitted as a full and complete response thereto. Applicants thank the Examiner for the allowance of claims 6 and 8. In view of the following remarks, favorable consideration of claims 1-5 and 7 is respectfully requested.

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Quinn Re. 31, 545. The Office Action takes the position that Quinn teaches or suggests all the features of the claimed invention. Applicants respectfully disagree. Accordingly, Applicant respectfully requests reconsideration of claims 1 and 2.

Claim 1 is directed to a differential amplifier that receives first and second input signals and generates first and second output signals. The differential amplifier comprises a first differential converter that includes a first grounded emitter amplifier that receives the first input signal and generates a first differential output signal, and a first grounded base amplifier that receives the first input signal and generates a second differential output signal. A second differential converter includes a second grounded emitter amplifier that receives the second input signal and generates a third differential output signal, and a second grounded base amplifier that receives the second input signal and generates a fourth differential output signal. The first output signal is generated by coupling the first differential output signal and the fourth differential output signal. The second output signal is generated by coupling the second differential output signal and the third differential output signal.

Figure 4 of Quinn discloses a feed-forward amplifier that includes a correction amplifier transistors 102 and 100 that are connected to the collector circuit of main amplifier transistors 70 and 71, eliminating the voltage divider networks. An additional cascode stage includes a common base amplifier transistors 140 and 142 that are inserted between the collector-current summing nodes and the load resistors 86 and 88 to reduce thermal distortion in the lower transistors. However, Quinn does not teach or suggest the features recited in claim 1.

For instance, the amplifiers 100 and 102 are not grounded emitter amplifiers but rather emitter coupled amplifiers (See Column 4, Lines 18-20). As a result, Quinn does not teach or suggest a differential amplifier as claimed in the present invention. Therefore, Quinn does not provide the advantage of improving the linearity of the differential output signals. Furthermore, since the emitters of the amplifiers 100 and 102 are coupled together via a resistor 105, the maximum currents of the amplifiers 100, 102 are determined by current sources 108, and 110 coupled to the amplifiers and are maintained constant. In other words, the emitter coupled amplifiers 100, 102 operate to change a flow of a current from either the current source 108 or the current source 110. Therefore, when a relatively large input signal is applied to one of the amplifiers 100, 102, it is not possible to obtain a large output signal corresponding to the large input signal, which makes it unable to improve the linearity of the output signal. In addition, the lack of linearity of the output signal makes it unable to improve the balance of the differential output signals even if the output of the emitter coupled amplifiers 100, 102, and the outputs of the grounded base amplifiers 78,80 are cross-coupled.

In contrast, the claimed invention utilizes grounded emitter amplifiers. As a result, the linearity of the differential output signals is improved and the balance of the differential output signals is improved and the balance of the differential output signals is also improved by cross-coupling. Therefore, when a relatively large input signal is applied to one of the grounded emitter amplifiers, a base biased voltage increases due to the large input signal, thereby increasing the current flowing to the amplifier. Accordingly, even if an idle current, which is based on a biased voltage is relatively small, the current increases by due to a self-bias effect when a large input signal is applied. As a result, a large output signal is obtained. Accordingly, utilizing the grounded emitter amplifiers improves the linearity of the differential output signals. Therefore, it is submitted that Quinn neither teaches nor suggests using grounded emitter amplifiers as in the present invention. As a result, Quinn does not provide the benefits and/or advantages of the claimed invention. Accordingly, Applicants submit that Quinn neither teaches nor suggests all the features of

the claimed invention. Therefore, Applicants request the withdrawal of the rejection of claim 1 under 35 U.S.C. 102(b).

Claim 2 is dependent upon claim 1, therefore for at least the reasons mentioned above, claim 2 also recites subject matter that is neither taught nor suggested by Quinn. Thus, Applicants request the withdrawal of the rejection of claim 2.

Claim 7 is rejected under 35 U.S.C. 103 (a) as being unpatentable over the Admitted Prior Art (Gilbert-cell mixer) in view of Quinn Re. 31, 545). The Office Action takes the position that the combination of the Gilbert-cell mixer and Quinn neither teaches nor suggests all the features recited in claim 7. Applicant respectfully requests reconsideration in view of the following remarks.

Claim 7 is directed to a mixer that mixes a first and second input signals with first and second carrier signals to generate first and second mixer output signals. The mixer comprises a differential amplifier that receives the first and second input signals and generates first and second output signals. The differential amplifier includes a first differential converter including a first grounded emitter amplifier that receives the first input signal and generates a first differential output signal and a first grounded base amplifier that receives the first input signal and generates a second differential output signal. A second differential converter including a second grounded emitter amplifier that receives the second input signal and generates a third differential output signal, and a second grounded base amplifier that receives the second input signal and generates a fourth differential output signal. The first output signal is generated by coupling the first differential output signal and the fourth differential output signal. The second output signal is generated by coupling the second differential output signal and the third differential output signal. A pair of differential circuits are connected to the differential amplifier, for receiving the first and second output signals and the first and second carrier signals to generate the first and second mixer output signals.

It is respectfully submitted that the combination of the Admitted Prior Art and Quinn neither teaches nor suggests the features recited in claim 7. It is submitted that neither

Quinn nor the APA teach or suggest the features of the different amplifier, as recited in claim 7.

As discussed above, the applied references neither teach nor suggest grounded emitter amplifiers as disclosed in the present invention. Therefore, Applicants submit that the applied prior art neither teaches nor suggests all the features recited in claim 7. Accordingly, Applicants request the withdrawal of the rejection of claim 7.

Claims 3-5 are objected to as being dependent upon a rejected base claim. The rewriting of claims 3-5 in independent form is being held in abeyance until the final disposition of rejected claims 1 and 2.

Therefore, in view of the distinctions discussed above, consideration and allowance of claims 1, 2, and 7 is respectfully requested. Applicants respectfully submit that claims 1, 2, and 7 contain subject matter that is neither taught nor suggested by the applied prior art. Therefore, Applicant submits that the application is now in condition for allowance with claims 1-8 contained therein.

Should the Examiner believe the application is not in condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

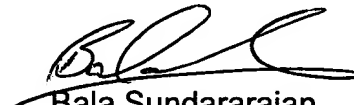
In the event this paper is not considered to be timely filed, Applicant respectfully petitions for an appropriate extension of time. The Commissioner is authorized to

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charge payment for any additional fees which may be required with respect to this paper to Counsel's Deposit Account 01-2300.

Respectfully submitted,

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